

7-8 Inverse Functions and Relations

ex:
 $y = 3x$

(1, 3)

(2, 6)

Change equation so that you would
 get (3, 1) and (6, 2).

$$y = \frac{1}{3}x$$

ex:

$$y = x + 5$$

(1, 6)

(2, 7)

$$y = x - 5$$

ex:

$$y = 3x - 1$$

(0, -1)

(2, 5)

$$y = \frac{x+1}{3}$$

(-1, 0)

(5, 2)

These equations are inverses of one
 another
 (switching of x and y)

Using function notation:

$$f(x) = 3x - 1 \quad f^{-1}(x) = \frac{x+1}{3}$$

If $f(a) = b$, then $f^{-1}(b) = a$.

$$f(0) = -1$$

$$f^{-1}(-1) = 0$$

$$f(2) = 5$$

$$f^{-1}(5) = 2$$

Given the relation:

$$\{(3, 3) (2, 5) (-2, 5) (-2, 2) (-1, 2) (-1, 3)\}$$

Find the inverse relation.

$$\{(3, 3) (5, 2) (5, -2) (2, -2) (2, -1) (3, -1)\}$$

Finding the inverse.

ex:

$$f(x) = \frac{-1}{2}x + 1$$

1. change to $y =$ 2. switch x and y 3. solve for y 4. change to $f^{-1}(x) =$

$$\begin{aligned} y &= \frac{-1}{2}x + 1 \\ x &= \frac{-1}{5}y + 1 \\ x - 1 &= \frac{-1}{5}y \\ -2x + 2 &= y \end{aligned}$$

$$f^{-1}(x) = -2x + 2$$

Find the inverse:

$$1. f(x) = \frac{3}{4}x - 6 \quad f^{-1}(x) = \frac{4}{3}x + 8$$

$$2. g(x) = \frac{x+2}{3} \quad g^{-1}(x) = 3x - 2$$

$x = \frac{y+2}{3}$
 $3x = y+2$

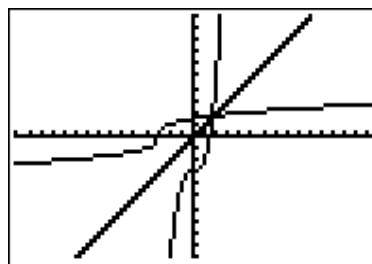
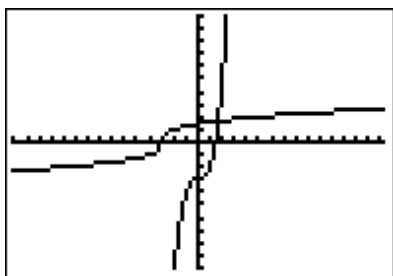
$$3. f(x) = x^3 - 3 \quad f^{-1}(x) = \sqrt[3]{x+3}$$

After finding the inverse, graph #3 and the inverse on your calc

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2001 MEMORY
1:ZBox
2:Zoom In
3:Zoom Out
4:ZDecimal
5:ZSquare
6:ZStandard
7↓ZTrig





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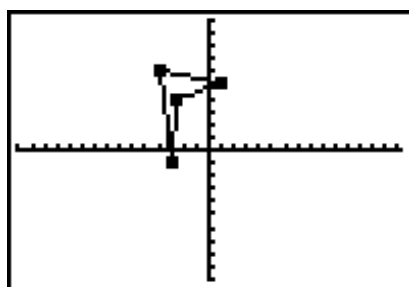
Graph the relation and its inverse:






$\{(1, 5) (-4, 6) (-3, -1) (-2.5, 4)\}$

L1	L2	L3	3
1	5		
-4	6		
-3	-1		
-2.5	4		
1			
-----	-----		
L3(t)=			

Plot1	Plot2	Plot3
Off		
Type:   		
Xlist: L1		
Ylist: L2		
Mark:  + .		

MEMORY
 1: ZBox
 2: Zoom In
 3: Zoom Out
 4: ZDecimal
 5: ZSquare
 6: ZStandard
 7: ZTrig

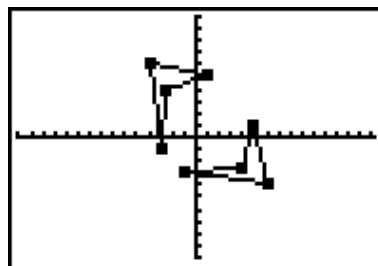


Plot1	Plot2	Plot3
Off		
Type:   		
Xlist: L2		
Ylist: 		
Mark:  + .		

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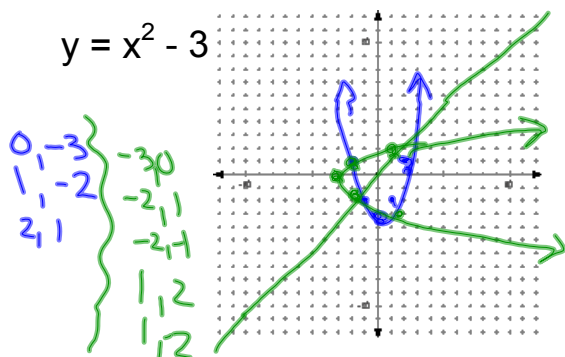
MEMORY
1:ZBox
2:Zoom In
3:Zoom Out
4:ZDecimal
5:ZSquare
6:ZStandard
7:ZTrig

```



Sketch the inverse.

$$y = x^2 - 3$$



Show that two functions are inverses of one another

Two functions are inverses of each other iff the composition is the identity function.

$$f(x) = x$$

$$[f \circ g](x) = x$$

$$[g \circ f](x) = x$$

Show $f(x) = \frac{-1}{2}x + 1$ and $g(x) = -2x + 2$ are inverses.

$$\begin{aligned} [f \circ g](x) & \quad [g \circ f](x) \\ &= \frac{-1}{2}(-2x + 2) + 1 \\ &= x - 1 + 1 \\ &= x \end{aligned}$$

HW p393
15-27 odd
32, 33